TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

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Spruce Budworm Increasing in Minnesota

The threat of a devastating spruce budworm (Choristoneura fumiferana (Clem.)) outbreak appears to be increasing in Minnesota. At stake are nearly 1¼ million acres of spruce-fir type, with balsam fir making up approximately 90 percent of the volume. Dependent in part on this vital forest resource are 6 pulp and paper mills in the State, and an additional 11 mills in other states. The annual harvest of balsam fir logs and bolts is valued at more than 3 million dollars. After processing into paper products this value is multiplied many times.

Injury by the budworm in Minnesota is confined to defoliation of the current year's growth, with the stand in early July appearing as though a light fire had run through the crowns. Present research indicates that the budworm population is on the increase. Unless biological or climatological influences intervene to alter this prospect, such populations can cause complete defoliation and result in top-killing of balsam fir. After 3 to 5 years of complete defoliation most of the balsam fir in infested stands will be dead or dying. During this period secondary bark beetles will supplement and hasten the destructive work of the budworm, thereby shortening the period for salvage operations.

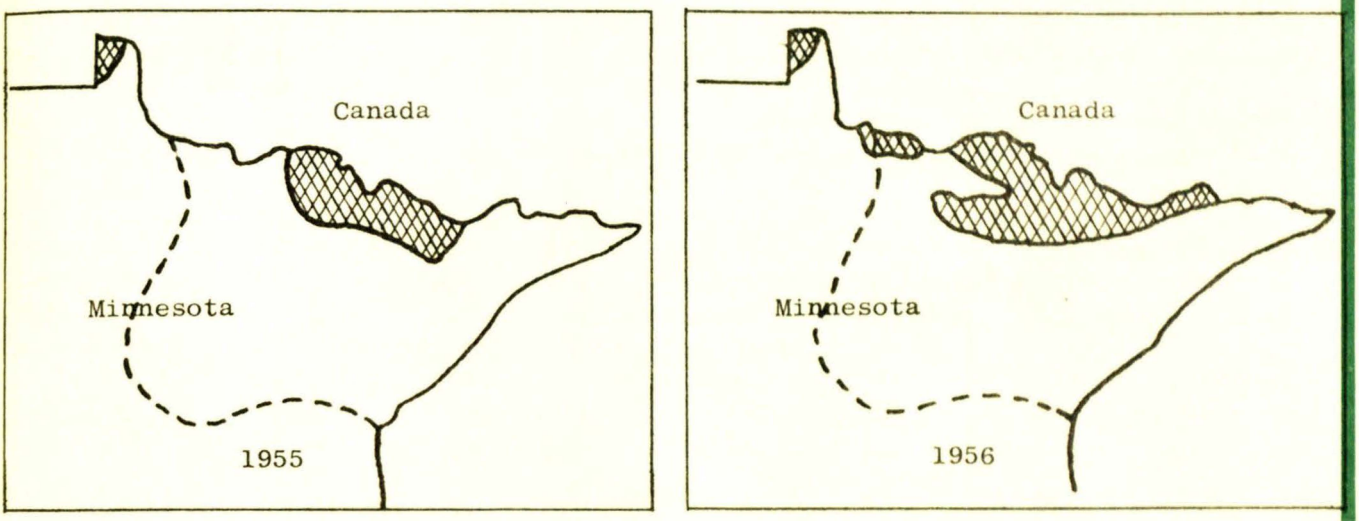

Figure 1.--Comparison of areas of moderate to heavy defoliation by the spruce budworm, 1955 and 1956. (Dotted line indicates extent of susceptible spruce-fir type in northeastern Minnesota.)

(over)

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MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

Coordinated ground and aerial surveys to determine the distribution and abundance of the spruce budworm in Minnesota in 1956 were conducted jointly by the Lake States Forest Experiment Station, the State Entomologist's Office, and the Minnesota Department of Conservation.

During late June larval collections were made at 97 permanent sampling plots scattered throughout northeastern and north central Minnesota. These collections showed an increase from 12 larvae in 1955 to 59 larvae in 1956. This general increase in larval population was reflected in an increase in the extent and severity of defoliation.

Moderate to heavy defoliation was observed over approximately 419,000 acres of spruce-fir type in northeastern Minnesota. This is an increase of about 339,000 acres over that observed in 1955. Within this area most of the balsam fir have lost 30 percent or more of their current foliage. In several isolated spots defoliation of current growth has been complete. Dead tops were noted at two locations--along the north shore of Kabetogama Lake and on an island in Wind Lake. At the latter at least 3 years of complete defoliation have occurred. No tree mortality attributable to the budworm was observed.

An egg mass survey, which provides a reliable index to the potential budworm population in each succeeding year, was made immediately after the aerial survey and was confined principally to known areas of defoliation. There was an average increase of 19 egg masses per collection point over the average for 1955. Egg parasitism was relatively light. The number of eggs per mass averaged 19--the same as in 1955.

Biological studies in 1956 showed no evidence of effective natural control. All evidence to date points to a further increase in the extent and severity of defoliation for 1957.

An expansion of studies of the factors affecting the natural control of the budworm is needed. Studies are already in progress to determine what forest conditions contribute to the effectiveness of natural control factors. Silvicultural studies to develop guides for sound management practices have been initiated but need to be intensified. Annual surveys to determine fluctuations in budworm population and extent of defoliation will be continued. These surveys will be carried on as a part of the state-federal-private cooperative forest insect survey program.